

WHAT IS CLAIMED IS:

1. A two-phase cooling apparatus for cooling an electronic assembly, the apparatus comprising:

an evaporator having a single-phase inlet for receiving a single-phase liquid coolant and a two-phase outlet for discharging a two-phase coolant;

5 a local condenser disposed proximate the evaporator and having a two-phase inlet coupled to the evaporator outlet, the local condenser including a single-phase liquid coolant outlet; and

a pump having an output coupled to the evaporator inlet, and an input coupled to the local condenser outlet.

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2. A two-phase cooling apparatus according to claim 1 wherein:
the pump comprises a local pump disposed proximate the evaporator inlet.

3. A two-phase cooling apparatus according to claim 1 and further comprising:

a single-phase liquid coolant inlet line coupled to the evaporator inlet;

and

5 a single-phase liquid coolant outlet line coupled to the local condenser outlet.

4. A two-phase cooling apparatus according to claim 3 and further comprising:

at least one single-phase coolant path disposed in parallel with the evaporator and condenser for carrying out single-phase heat transfer.

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5. A method of cooling an electronic assembly, the method comprising the steps:

pumping a single-phase liquid coolant onto the electronic assembly;
exchanging heat proximate a first electronic device on the electronic
5 assembly with the single-phase liquid coolant, and evaporating a portion of the single-phase liquid coolant to form a two-phase coolant;
condensing the two-phase coolant back to a single-phase liquid
coolant; and
routing the condensed single-phase liquid coolant off the electronic
10 assembly.

6. A method according to claim 5 and further comprising the step:
directing a portion of the single phase coolant proximate a second
electronic device on the electronic assembly to effect single phase cooling for the
second electronic device.

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7. A two-phase cooling apparatus for cooling an electronic assembly, the apparatus comprising:

an evaporator having a single-phase inlet for receiving a single-phase
liquid coolant and a two-phase outlet for discharging a two-phase coolant;
5 means for condensing the two-phase coolant to a single-phase coolant,
the means for condensing disposed on the electronic assembly; and
a remote pump having an output coupled to the evaporator inlet, and an
input coupled to the means for condensing.

8. A two-phase cooling apparatus according to claim 7 wherein the means for condensing comprises:

a local condenser disposed proximate the evaporator and having a two-phase inlet coupled to the evaporator outlet, the local condenser including a single-phase liquid coolant outlet.

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9. A two-phase cooling apparatus according to claim 7 wherein the means for condensing comprises:

a single-phase coolant path disposed in parallel with the evaporator, the single-phase coolant path coupled to the evaporator outlet to mix sufficient single-phase coolant with the two-phase coolant and condense the two-phase coolant to a single-phase coolant.

10. A two-phase cooling apparatus for cooling an electronic assembly, the apparatus comprising:

means for pumping a single-phase liquid coolant onto the electronic assembly;

means for exchanging heat proximate an electronic device on the electronic assembly with the single-phase liquid coolant, and evaporating a portion of the single-phase liquid coolant to form a two-phase coolant;

means for condensing the two-phase coolant back to a single-phase liquid coolant; and

means for routing the condensed single-phase liquid coolant off the electronic assembly.

11. A two-phase cooling apparatus according to claim 10 and further comprising:

means for directing a portion of the single phase coolant proximate a second electronic device on the electronic assembly to effect single phase cooling for the second electronic device.

12. A two-phase cooling apparatus according to claim 10 wherein the means for pumping comprises a remote pump.

13. A two-phase cooling apparatus according to claim 10 wherein the means for pumping comprises a local pump disposed proximate the means for exchanging heat.

14. A two-phase cooling apparatus according to claim 10 wherein the means for exchanging heat comprises an evaporator having a single-phase inlet for receiving a single-phase liquid coolant, and a two-phase coolant outlet.

15. A two-phase cooling apparatus according to claim 10 wherein the means for condensing comprises a local condenser disposed proximate the means for exchanging heat and having a two-phase inlet coupled to the means for exchanging heat, the local condenser including a single-phase liquid coolant outlet.

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16. A two-phase cooling system for cooling a plurality of electronic assemblies in a semiconductor tester, the two-phase cooling system comprising:

a liquid pump having an inlet and an outlet;
an inlet manifold coupled to the pump outlet;

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a plurality of cooling assemblies having respective inlets coupled to the inlet manifold, each of the cooling assemblies including

an evaporator having a single-phase inlet coupled to the cooling assembly inlet for receiving a single-phase liquid coolant and a two-phase outlet for discharging a two-phase coolant; and

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a local condenser disposed proximate the evaporator and having a two-phase inlet coupled to the evaporator outlet, the local condenser including a single-phase liquid coolant outlet;

an outlet manifold coupled to the cooling assembly outlets, the outlet manifold disposed in liquid communication with the liquid pump inlet.

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17. A two-phase cooling apparatus according to claim 16 wherein:
the liquid pump comprises a local pump disposed proximate the evaporator inlet.

18. A two-phase cooling apparatus according to claim 16 and further comprising:

a single-phase liquid coolant inlet line coupled to each evaporator inlet;
and

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a single-phase liquid coolant outlet line coupled to each local condenser outlet.

19. A two-phase cooling apparatus according to claim 16 and further comprising:
- at least one single-phase coolant path disposed in parallel with each evaporator and condenser for carrying out single-phase heat transfer.

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